CLAIMS

1. A balanced crystal oscillator circuit comprising:
a piezoelectric element (207; 215; 222,221; 313); a first oscillator subcircuit (202;210;218;302) incorporating a transistor (204;212;220;304); and a second oscillator subcircuit (201;209;217;301) incorporating a transistor (203;211;219;303); wherein the transistors each have different types of transistor terminals (C,B,E; D;G;S), and wherein the oscillator subcircuits are configured with at least three interconnections;
CHARACTERIZED IN THAT
each interconnection comprises a pair of like type of transistor terminals;
wherein a first of said interconnections constitutes a connection to a ground reference (gnd; Vcc); a second of said interconnections is via a first resonator element (207;215;223;313); and a third of said interconnections is via a second resonator element (208;216;224;314); said first and second circuits are arranged to interact by means of said first and second resonator elements to form a balanced oscillator signal.

2. A balanced crystal oscillator circuit according to claim 1, characterized in that the balanced output signal is provided at a first circuit junction (T1a; T2a; T3a) and at a second circuit junction (T1b; T2b; T3b) connected to a first and second terminal, respectively, from one of the pairs of like type of transistor terminals; which like types of transistor terminals are interconnected by a resonator element (207;208;215;216;223;224;313;324).

3. A balanced crystal oscillator circuit according to claim 1 or 2, characterized in that the transistors are of the Bipolar Junction Transistor (BJT) type.

4. A balanced crystal oscillator circuit according to claim 3, characterized in that the first, second, and third of said interconnections consist of a pair of

collector-type terminals, base-type terminals, and emitter-type terminals, respectively; thereby configuring the balanced oscillator circuit with a dual common-collector transistor coupling.

5. A balanced crystal oscillator circuit according to claim 3 characterized in that the first, second, and third of said interconnections consist of a pair of base-type terminals, collector-type terminals, and emitter-type terminals, respectively, thereby configuring the balanced oscillator circuit with a dual common-base transistor coupling.

6. A balanced crystal oscillator circuit according to claim 4 or 5, characterized in that the first resonator element is constituted by a piezoelectric element (207;215;313) and the second resonator element (208;216;314) is constituted by a capacitor.

7. A balanced crystal oscillator circuit according to claim 3, characterized in that the first, second, and third of said interconnections consist of a pair of emitter-type terminals, collector-type terminals, and base-type terminals, respectively, thereby configuring the balanced oscillator circuit with a dual common-emitter transistor coupling.

8. A balanced crystal oscillator circuit according to any of claims 1 to 7, characterized in that at least one the transistors is/are provided with bias current by means of a resistor (Re) coupled between the emitter of a transistor and a supply voltage.

9. A balanced crystal oscillator circuit according to any of claims 1 to 7 characterized in that at least one of the transistors is/are provided with bias current by means of an active current source (403,401,402).

10. A balanced crystal oscillator circuit according to any of claims 3 to 9 characterized in that the transistors are operated in class C.

11. A balanced crystal oscillator circuit according to claim 1 or 2 characterized in that the transistors are of the Metal Oxide Semiconductor (MOS) type.

12. A balanced crystal oscillator circuit according to claim 11, characterized in that the first, second, and third of said interconnections consist of a pair of drain-type terminals, gate-type terminals, and source-type terminals, respectively; thereby configuring the balanced oscillator circuit with a dual common-drain transistor coupling.

13. A balanced crystal oscillator circuit according to claim 11 characterized in that the first, second, and third of said interconnections consist of a pair of gate-type terminals, drain-type terminals, and source-type terminals, respectively, thereby configuring the balanced oscillator circuit with a dual common-gate transistor coupling.

14. A balanced crystal oscillator circuit according to claim 12 or 13 characterized in that the first resonator element is constituted by a piezoelectric element and the second resonator is constituted by a capacitor.

15. A balanced crystal oscillator circuit according to any of claims 1 to 14 characterized in that the oscillator circuit is configured with an RC-circuit (Rf, Cf) forming a loop-gain pole in the frequency range above a primary oscillating frequency of the oscillating output signal.

16. An integrated circuit (502) comprising a circuit which in combination with the resonator elements constitutes the oscillator as set forth in any of claims

1 to 15; said integrated circuit comprising terminals for electric interconnection with the resonator elements.

17. An integrated circuit comprising a circuit, which in combination with a piezoelectric element constitutes the oscillator as set forth in any of claims 1 to 16; said integrated circuit comprising terminals for electric interconnection with the piezoelectric element.

18. A mobile telephone comprising the oscillator as set forth in any of claims 1 to 16.